CLAIMS

What is claimed is:

1. A field-of-view illuminator, comprising;

a variable illuminator responsive to a signal to direct a first beam to a plurality of locations in a field of view,

a detector aligned to receive energy scattered from the first beam, and

an electronic controller operatively coupled to said detector and said variable illuminator, the electronic controller operative to automatically vary the power of the first beam inversely proportionally to the received energy.

2. The field-of-view illuminator of claim 1, wherein said variable illuminator includes;

a beam source responsive to a signal to produce a second beam, and

a mirror aligned to deflect the second beam, forming the first beam that scans across the field of view.

3. The field-of-view illuminator of claim 1, further comprising;

a frame buffer operable to contain values for driving said variable illuminator,

a leveling circuit operatively coupled to said detector and said frame buffer, the leveling circuit being responsive to the detector to modify the values in said frame buffer.

4. The field-of-view illuminator of claim 3 wherein the leveling circuit is operative to increase the output of said variable illuminator to locations that scatter relatively low amounts of energy.

5. The field-of-view illuminator of claim 3, wherein said leveling circuit is operative to decrease the output of said variable illuminator to locations that scatter relatively high amounts of energy.

6. The field-of-view illuminator of claim 1, wherein variable illuminator is responsive to a signal to modulate its output to produce substantially uniform detected energy across the field of view and the image in the field of view is substantially represented by the inverse of a frame buffer in said controller.

7. A method for illuminating a field-of-view, comprising the steps of;

illuminating a plurality of spots in a field of view with a first illumination pattern,

measuring the energy scattered from each of the plurality of spots in response to the first illumination pattern,

responsive to said measurement, automatically determining a second illumination pattern corresponding to a reduced range of scattered light energy, and

illuminating the plurality of spots with the second illumination pattern.

8. The method for illuminating a field-of-view of claim 7, wherein the process of illuminating, measuring and adjusting the illumination pattern is repeated until the range of scattered light energy is reduced to a desired range.

9. The method for illuminating a field-of-view of claim 8, wherein the desired range of scattered light energy is one that falls substantially within the dynamic range of a detector.

10. The method for illuminating a field-of-view of claim 7, wherein said step of determining a second illumination pattern corresponding to a reduced range of scattered light energy, further comprises the steps of;

inverting the pattern of measured scattered energies from the plurality of spots, and

adding the inverted pattern of measured scattered energies to the first illumination pattern to produce the second illumination pattern.

11. The method for illuminating a field-of-view of claim 7, wherein said step of determining a second illumination pattern corresponding to a reduced range of scattered light energy, further comprises the steps of;

inverting the pattern of measured scattered energies from the plurality of spots,

adjusting the magnitude of the inverted pattern of measured scattered energies from the plurality of spots corresponding to an adjustment gain, and

adding the adjusted inverted pattern of measured scattered energies to the first illumination pattern to produce the second illumination pattern.

12. A scanned beam imager, comprising;

a frame buffer operative to produce a source signal,

an emitter responsive to the source signal to emit a modulated beam of electromagnetic energy,

a scanner positioned to receive the modulated beam of electromagnetic energy and operative to scan the beam across a field-of-view,

a detector aligned to detect modulated electromagnetic energy scattered from the field-of-view and operative to produce a detection signal responsive to the detected modulated electromagnetic energy, and

a controller coupled to said detector and said frame buffer, said controller being responsive to the detection signal to adjust values in said frame buffer.

13. The scanned beam imager of claim 12, wherein the field-of-view is two-dimensional.

14. The scanned beam imager of claim 12, wherein said controller further comprises;

a bar code decoder.

15. The scanned beam imager of claim 12, wherein said controller further comprises;

a leveling circuit operative to load values into said frame buffer responsive to the amount of electromagnetic energy received by said detector.

16. The scanned beam imager of claim 12, wherein;

said controller is operative to converge said frame buffer such that at least a portion of image information from the field-of-view may exist as frame buffer data.

17. The scanned beam imager of claim 16, wherein;

the frame buffer is operative to converge such that substantially all the image information from said field-of-view exists as frame buffer data.

18. A scanner, comprising;

a timer-controller that is operative to produce pulses at a rate,

an illuminator operatively connected to said timer-controller that emits light responsive to said pulses,

a deflector operable at a variable angular velocity aligned to deflect the light across a field of view, and

a detector oriented to detect light scattered from the field of view, said detector being preferentially sensitive to the rate of the pulses.

19 The scanner of claim 18, wherein said deflector is operative at a scan speed that varies sinusoidally.

20. The scanner of claim 19 wherein said deflector is operative to scan in more than one dimension at scan speeds that vary sinusoidally in at least two of the dimensions.

21. The scanner of claim 19, wherein said pulse rate is constant.

22. The scanner of claim 18, further comprising;

a controller coupled to said detector that produces a substantially rectilinear image from the detected scattered light.

23. A scanner, comprising;

a timer-controller operative to produce pulses at a variable rate,

an illuminator that is operative to emit light responsive to pulses received from said timer-controller,

a scanner aligned to deflect the light across a field of view, and

a detector aligned to detect light scattered from said field of view tuned to be preferentially sensitive to an instantaneous rate of the pulses.

24. The scanner of claim 23, further comprising;

a controller coupled to said detector operative to assemble an image of the field-of-view.

24. The scanner of claim 23, further comprising;

an indicia decoder coupled to said detector operative to decode machine readable indicia.

25. The scanner of claim 24, wherein said indicia include bar codes.

26. A method for illuminating a field-of-view, comprising the steps of;

automatically determining a first illumination energy optimum for a first spot in a field-of-view,

automatically determining a second illumination energy optimum for a second spot in the field-of-view, and

automatically illuminating the field-of-view such that said first spot receives said first illumination energy and said second spot receives said second illumination energy.

27. The method for illuminating a field-of-view of claim 26, wherein said step of automatically determining said first and second optimum illumination energies further comprises the steps of;

determining a detector sensitivity at each of said first and second spots, and

adjusting said determined illumination energies to compensate for said detector sensitivity.

28. The method for illuminating a field-of-view of claim 26, wherein said illuminating step further comprises the steps of;

scanning an illumination beam across the field of view, and

modulating the power of said illumination beam such that said first spot receives said first illumination energy and said second spot receives said second illumination energy.

29. The method for illuminating a field-of-view of claim 28, wherein said automatic determination of the first and second illumination energies further comprises the steps of;

determining the beam sweep speed at each of said first and second points, and

adjusting the power of said illumination beam to compensate for beam sweep speed.

30. The method for illuminating a field-of-view of claim 26, wherein said illuminating step further comprises the steps of;

selecting a first illuminator aligned to illuminate said first spot,

selecting the output power of said first illuminator to correspond to said first illumination energy,

illuminating said first spot with said first illuminator,

selecting a second illuminator aligned to illuminate said second spot,

selecting the output power of said second illuminator to correspond to said second illumination energy, and

illuminating said second spot with said second illuminator.

31. The method for illuminating a field-of-view of claim 30, wherein the automatic determination of said first and second illumination energies further includes the steps of;

accounting for illumination patterns of available illuminators, and

adjusting the power of said first and second illuminators to compensate for the illumination patterns of the available illuminators.

32. The method for illuminating a field-of-view of claim 26, wherein said illuminating step further comprises the steps of;

selecting a first illumination attenuator aligned to said first spot,

attenuating the illumination of said first spot with said first illumination attenuator,

selecting a second illumination attenuator aligned to said second spot, and

attenuating the illumination of said second spot with said second illumination attenuator.

33. The method for illuminating a field-of-view of claim 26, wherein said step of automatically determining said first and second optimum illumination energies further comprises the steps of;

receiving light scattered from said first and second spots,

converting said scattered light from optical to corresponding electrical signals,

measuring the level of said electrical signals,

determining the electrical signal levels relative to a pre-determined range of possible electrical signal levels, and

predicting said first and second proper illumination energies.

34. The method for illuminating a field-of-view of claim 33, wherein said proper illumination energies cause substantially equal scattered light energies to be received from said first and second spots.

35. The method for illuminating a field-of-view of claim 33, wherein;

said first spot is darker than said second spot, and

said first optimum illumination energy is higher than said second optimum illumination energy.

36. An image capture device, comprising;

a frame buffer operative to hold a pattern,

a scanned beam source coupled to said frame buffer and responsive to said frame buffer to form a beam corresponding to the pattern, the scanned beam source being operative to direct the beam across a field-of-view,

a detector aligned to detect light scattered from the field-of-view, the detector being responsive to light from the field of view to produce a signal, and

a leveling circuit coupled to said detector and responsive to said signal to modify the pattern in said frame buffer.

37. The image capture device of claim 36, wherein said leveling circuit causes the pattern in said frame buffer to drive said beam source at a lower energy when the amount of detected scattered light is high.

38. The image capture device of claim 36, wherein said leveling circuit causes the pattern in said frame buffer to drive said beam source at a higher energy when the amount of detected scattered light is low